Characteristics of asynchronous online discussions in a graduate course: an exploratory study

Xiaofeng Li

Department of Information and Library Science, Clarion University of Pennsylvania, Clarion, Pennsylvania, USA, and

Yawen Yu

Division of Human Communication, Development and Information Sciences, Faculty of Education, University of Hong Kong, Hong Kong, Hong Kong

Abstract

Purpose – This paper aims to investigate the following questions: What are the types of discussion prompts in a fully online graduate course? What are the key characteristics of students’ discussion initial posts and replies in a fully online graduate course? In what ways, if any, do discussion prompts influence the types of initial posts and replies in discussion threads?

Design/methodology/approach – This study adopted a qualitative approach to explore the dynamics of students’ knowledge construction through using asynchronous discussion boards. A total of 20 discussion prompts and 115 discussion threads from nine archival discussion boards in a fully online library science course were collected and analyzed.

Findings – The findings identified open-ended, explanatory and reflective prompts in discussion boards. Students engaged in simply stating, paraphrasing, elaborating, extending, reflecting, socializing and sharing emotions in discussion posts. These findings highlighted the interconnectedness of reflection and socio-emotional interactions in a community of inquiry and pointed out their important roles to support richer and deeper online discussions. The study further observed linkages between the types of discussion prompts and the types of discussion posts.

Originality/value – This study addressed an urgent need to understand the use of online discussion boards in an emergency remote teaching condition in a pandemic. The findings of this study offered educators insights into evidence-based design recommendations for prompts to support students’ knowledge construction and deep learning through using discussion boards.

Keywords Knowledge construction, Remote education, Online teaching and learning, Emergency remote teaching, Asynchronous discussion boards, Educational design

Paper type Research paper

The COVID-19 global health crisis has caused many universities and schools to transform their traditional face-to-face instructional activities into an online teaching format. When this emergent shift occurred during midsemester and a pandemic, it became a challenge for educators, especially those who have not been trained to teach online, to choose technological tools and design instructional activities within a short period. It becomes more
critical than ever for educators to understand how students learn remotely and how instructional strategies and technological tools afford learning in a fully online environment.

In the current condition of emergency remote teaching, discussion boards are increasingly adopted by educators as a quick and easy tool for teaching and learning (Lang, 2020; McMurtrie, 2020). Asynchronous discussion boards have been used in online education for decades because they afford students to learn collaboratively and interactively (Rowntree, 1995) and increase students’ engagement with classes (Collins et al., 2019). However, researchers also pointed out the barriers of using discussion boards in learning. When discussion boards were structured as simply questioning and answering, students did not reach a high level of cognitive presence (Darabi et al., 2011). Students engaged in an “isolated mode of participation” rather than interactive learning in asynchronous discussions (Thomas, 2002, p. 362). Students mostly engaged in information acquisition rather than critical thinking (Bonafini et al., 2017). These studies highlight that simple adoption of discussion boards in online classes cannot replicate in-person class interactions nor warrant effective teaching and learning.

For educators to provide and facilitate meaningful learning in asynchronous discussions, it is important to first understand how students engage in discussion boards. Thus, this study uses discussion boards in a fully online library science course to examine how graduate students interact with each other and develop their ideas in response to various types of discussion prompts. This will address an urgent need to understand and improve the use of online discussion boards in an emergency remote teaching condition in a pandemic.

Literature review

Students’ engagement in online discussions
A review of the current literature on the use of discussion boards in online courses shows that much research has taken quantitative approaches to show students’ learning and engagement with classes. For instance, Collins et al. (2019) used descriptive measurements, such as the number and the length of each asynchronous discussion post, to characterize graduate students’ participation in an occupational therapy class. Luo et al. (2019) analyzed the number of posts that each student posted and the average length of each post to show students posted more on Twitter than Blackboard. Ghadirian et al. (2019) used students’ log files and social network analysis to demonstrate that students participated in online discussions more often when they were assigned as peer moderators. Song et al. (2019) used log data such as the frequency and length of course access, quantity and quality of discussion posts, and final grades to measure their engagement with learning content.

Studies have also explored students’ learning and engagement with disciplinary knowledge through their efforts in initiating and following conversations in asynchronous discussion boards. For example, van Aalst (2009) examined and evaluated 40 secondary school student groups’ online discourses. His findings suggested that students engaged in knowledge sharing, knowledge construction and knowledge creation discourses. Students that had most knowledge creation discourses demonstrated the best academic performance (van Aalst, 2009). Luo et al. (2019) used an existing coding scheme to show that discussions on Twitter produced a predominantly conceptual and procedural type of knowledge, followed by metacognitive knowledge and factual knowledge. They further found that social interactions were not evident in Twitter discussions.

Cognitive, social and teaching presence in a community of inquiry
Discussion boards can afford students to formulate a Community of Inquiry – CoI (Garrison et al., 1999). Meaningful interactions in a community of inquiry can lead to collective inquiry, which is described as a process of articulating individual thoughts,
exploring relevant information, integrating divergent ideas, reaching final resolutions and ultimately advancing communal understandings in a given knowledge domain (Chan, 2012). One of the important dimensions of CoI is cognitive presence. Garrison et al. (2001) defined cognitive presence as the extent to which learners were able to construct and confirm meaning through sustained reflection and discourse in a community. This process included four sequential activities: triggering, exploration, integration and resolution. These activities were iterative as new information triggered further inquiries.

Social presence and teaching presence were considered as important means to support cognitive presence (Garrison et al., 1999). The notion of social presence was defined as “the ability of participants in the community of inquiry to project their personal characterizations into the community, thereby presenting themselves to other participants as ‘real people’” (Garrison et al., 1999, p. 89). In particular, participants engaged with affective activities, open communication and cohesive activities (Rourke et al., 1999) to accommodate the barriers caused by physical distance. Teaching presence critically supported students’ cognitive and social presence (Garrison et al., 1999). In an online learning environment, teaching presence was manifested as the various instructional strategies that an educator designed to facilitate students’ understanding of the course materials and subject matters. These strategies ranged from selecting and organizing the presentation of primary course material, designing learning activities, to creating assessments (Garrison et al., 1999).

A number of studies characterized students’ engagement through the lens of CoI. For example, Kilis and Yildirim (2019) examined the patterns of college students’ discussions in an asynchronous learning environment, particularly in the aspects of social, cognitive and teaching presence in their discussion postings. They concluded that topics based on students’ real-life scenarios were conducive to a high level of social and cognitive presence. Similarly, Al Tawil (2019) conducted surveys and interviews to investigate if nonverbal communication (e.g. emoticons, profile pictures, photographs of family or pets, font style, color, size and format, etc.) had an impact on graduate students’ perceptions of social presence, and to explore the contributing factors that influenced students’ perception of teaching presence. Henrikson (2019) examined the extent to which educators’ use of meta-cognitive reflection prompts in their presentation shaped graduate students’ cognitive presence in discussion forums.

Built upon prior research, this study aims to explore how students discuss assigned topics in asynchronous online discussion boards. In particular, the following questions are explored:

\( RQ1 \). What are the types of discussion prompts in a fully online graduate course?

\( RQ2 \). What are the key characteristics of students’ discussion initial posts and replies in a fully online graduate course?

\( RQ3 \). In what ways, if any, do discussion prompts influence the types of initial posts and replies in discussion threads?

Answering these research questions can reveal the dynamics of students’ discussion posts in response to various types of discussion prompts. The findings of this study offer educators evidence-based design recommendations for prompts to elicit students’ reflection and socio-emotions interactions to support knowledge construction through using discussion boards.
Methodology

Data sources

Data collected for this study were from a fully online master’s course in a library science program in the USA. This course covered topics on the organization of information in library communities. Twenty-eight students were enrolled in this course. Each week students were required to read the assigned readings, watch the instructor’s lectures and engage in a number of assignments asynchronously. In each discussion board, the instructor posted two to three discussion prompts which aimed to probe students’ understanding of given topics. Students were required to write an initial post to address these given prompts and then post at least two replies to their classmates’ initial posts. Each discussion thread began with a student’s initial post and followed with other students’ replies. Students were also required to make connections to course materials in their initial posts.

With the approval from the Institutional Review Board, a total of 20 discussion prompts archived in nine discussion boards were collected after the course ended. These 20 discussion prompts were first grouped based on their question types. Then a total of 115 discussion threads were selected for further content analysis because these discussion threads cover the various types of discussion prompts.

Data analysis

Discussion threads were imported to Nvivo 12 – qualitative data analysis software. Data analysis followed the constant comparison method (Charmaz, 2014), starting with an initial round of open coding, and followed by rounds of focused coding once some codes became more frequent and salient in the data. To ensure the trustworthiness of the data analysis, 20% of the data were coded by both researchers and an acceptable inter-coder reliability score achieved ($\rho = 0.75$).

Findings

The following sections first report the types of discussion prompts that the instructor designed. Then the characteristics of students’ initial posts and replies are identified to depict how students develop ideas through online discussions. Lastly, the linkages between the types of discussion prompts and the types of discussion posts are described and discussed. All names reported are pseudonyms.

Types of discussion prompts

Data analysis showed that the discussion prompts fell into three categories, including fifteen open-ended questions, three explanatory questions and two reflective questions. Open-ended questions asked students to describe and discuss their understandings of a given topic. For example, one discussion prompt was to “discuss the issues surrounding authority control, especially relating to authors’ names.” Explanatory questions encouraged students to justify their perspectives on a given topic. For example, one prompt was to explain “why do you think we needed RDA in library communities?” Reflective questions afforded students to think what they learned and recognize their knowledge development. For example, the instructor asked “we have learned a number of standards and models, including FRBR, LRM, RDF, MARC, XML, BIBFRAME, AACR2, ISBD, and RDA. Develop two questions that you want to further discuss with your classmates.”
Characteristics of initial posts

The following major themes emerged in students’ initial posts: simple stating, elaborating ideas, extending ideas, reflecting ideas and sharing emotions. These showed different ways that the students responded to the discussion prompts. These themes and their sub-themes are listed in an order of descending frequency in Table 1, with examples selected to demonstrate each sub-theme.

Findings show that graduate students mostly made simple statements about their understandings of a given topic, which was coupled with making connections to course materials to further support their statements. Students also gave scenario cases and used common knowledge as examples to elaborate their thoughts. In addition to elaborating ideas, students often used external resources to enrich their discussions and posed specific questions to their classmates. These show that students exercised their agency and made an effort to extend their understandings. Comparatively, students did not show much reflection in their initial posts, which may be due to the nature of discussion prompts. It was also found that students sometimes shared their emotions on a given topic, among which excitement and hope appeared more often than uncertainties and frustrations.

Characteristics of replies

Data analysis further shows the dynamics of students’ replies. Table 2 lists the ways in which students engaged with each other.

Among these identified characteristics in replies, students mostly agreed with others and paraphrased their ideas. Students further elaborated their ideas by sharing their personal

<table>
<thead>
<tr>
<th>Initial posts</th>
<th>Examples</th>
<th>No. of instances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple stating</td>
<td>BIBFRAME is a tool to show how bibliographic resources are related</td>
<td>336</td>
</tr>
<tr>
<td><strong>Elaborating</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using course materials</td>
<td>According to our class textbook, an access point is defined as...</td>
<td>206</td>
</tr>
<tr>
<td>Giving examples</td>
<td>For example, the 20th century actress Judy Garland would be known by many names...</td>
<td>40</td>
</tr>
<tr>
<td>Sharing personal experiences</td>
<td>All of the libraries that I have worked in have used MARC records as the standard for cataloging...</td>
<td>38</td>
</tr>
<tr>
<td><strong>Extending</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using external resources</td>
<td>In seeking to understand BIBFRAME, I reviewed several videos from the Library of Congress, but I found this one, entitled...</td>
<td>137</td>
</tr>
<tr>
<td>Raising questions and issues</td>
<td>How well equipped are most library staff to accomplish a transfer of this magnitude?</td>
<td>91</td>
</tr>
<tr>
<td>Reflecting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reflecting ideas improvement</td>
<td>Before this class I have never heard of BIBFRAME. After reading this paper I was able to understand...</td>
<td>65</td>
</tr>
<tr>
<td>Justifying own thoughts</td>
<td>I chose just these two controlled vocabulary terms because...</td>
<td>28</td>
</tr>
<tr>
<td><strong>Sharing emotions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive emotions</td>
<td>I am excited to see what the future holds regarding advancing into this new direction</td>
<td>45</td>
</tr>
<tr>
<td>Uncertain emotions</td>
<td>I also was frustrated not to find a term for bakery cookbooks</td>
<td>29</td>
</tr>
</tbody>
</table>

Table 1. Characteristics of discussion board initial posts
experiences and attitudes to a given topic, as well as making references to resources to support their statements. Comparatively, it appeared that students less frequently engaged in asking further questions, answering questions, adding new ideas, generating new understandings and reflecting. While these were less prevalent, they were invaluable contributions to an online learning community. It was also noted that in the replies, there was a stronger social presence where students conversed off-topics with others and invited further conversations.

Data analysis further showed that students often shared their emotions in replies, especially when they reflected on their understanding of a given topic. These emotions were mostly uncertainties and confusion, unlike in initial posts where students often expressed their positive emotions such as excitement toward a topic. It also appeared emotions were intertwined with social interactions. When a student expressed his/her uncertainties, others could empathize and relate to these emotions. For example, Sarah wrote: “It seems like we are all on the same page in this thread. That makes me feel good, because I’m not alone in feeling a little intimidated by it all.” To some extent, reflection, emotions and social interactions all appeared to be intertwined and contribute to a richer content in discussion posts.

**Linkages between discussion prompts and discussion posts**

To gain an additional understanding of the linkages between the emergent themes of discussion posts and the types of discussion prompts, a matrix coding query in Nvivo 12
was conducted. This analysis allowed us to explore whether discussion prompts showed any observable patterns of relationship to the types of discussion posts they elicited. Tables 3 and 4 show the percentage of each emergent characteristic in initial posts and replies, respectively, across various discussion prompts. The order of the columns of open-ended, explanatory and reflective prompts in Tables 3 and 4 corresponds to the sequence of instructional activities in discussion boards.

It appears that when the discussion prompts were open-ended, students often engaged in making simple statements ($n = 145$; 41.31%) and elaborating ideas using resources and examples ($n = 146$; 41.60%) to strengthen their statements. When students responded to explanatory prompts, they frequently engaged in reflection ($n = 48$; 14.41%). This may be because when students justified their claims in discussions, they needed to reveal their thinking processes in making those claims. For example, Tina wrote “I first searched through the LCSH using terms that I thought would be included [...] but when I could not find that specific term, I used a different tactic [...]” Comparatively, reflective prompts elicited more ideas extending ($n = 55$; 59.78%), reflecting ($n = 15$; 16.30%) and sharing emotions ($n = 15$; 16.30%).

Interestingly, data analysis showed that open-ended prompts elicited more reflective statements in replies ($n = 19$; 9.55%), while students did not appear to engage in much reflection in initial posts. Perhaps sharing diverse ideas in initial posts afforded students to be more reflective of their own thoughts as discussions moved on. It was also worth noting that students engaged in further inquiring and adding new ideas in replies to extend their collective understanding of a given topic ($n = 33$; 16.58%).

When students responded to explanatory prompts, they appeared to socialize ($n = 53$; 16.16%) and share emotions ($n = 26$; 7.93%) frequently in replies. Perhaps this was because when students externalized their understanding of a given topic and justified their claims, they became aware of their knowledge gap and experienced uncertainties.

<table>
<thead>
<tr>
<th>Initial posts</th>
<th>Open-ended prompts</th>
<th>N (%)</th>
<th>Explanatory prompts</th>
<th>N (%)</th>
<th>Reflective prompts</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple stating</td>
<td>145 (41.31%)</td>
<td></td>
<td>113 (33.93%)</td>
<td></td>
<td>1 (1.09%)</td>
<td></td>
</tr>
<tr>
<td>Ideas elaborating</td>
<td>146 (41.60%)</td>
<td></td>
<td>110 (33.03%)</td>
<td></td>
<td>6 (6.52%)</td>
<td></td>
</tr>
<tr>
<td>Ideas extending</td>
<td>45 (12.82%)</td>
<td>27 (8.11%)</td>
<td></td>
<td></td>
<td>55 (99.78%)</td>
<td></td>
</tr>
<tr>
<td>Reflecting</td>
<td>7 (1.99%)</td>
<td>48 (14.41%)</td>
<td></td>
<td></td>
<td>15 (16.30%)</td>
<td></td>
</tr>
<tr>
<td>Sharing emotions</td>
<td>8 (2.28%)</td>
<td>35 (10.51%)</td>
<td></td>
<td></td>
<td>15 (16.30%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>351 (100%)</td>
<td>333 (100%)</td>
<td></td>
<td></td>
<td>92 (100%)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Replies</th>
<th>Open-ended prompts</th>
<th>N (%)</th>
<th>Explanatory prompts</th>
<th>N (%)</th>
<th>Reflective prompts</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledging</td>
<td>94 (47.24%)</td>
<td>129 (39.33%)</td>
<td></td>
<td></td>
<td>96 (28.83%)</td>
<td></td>
</tr>
<tr>
<td>Elaborating</td>
<td>41 (20.60%)</td>
<td>57 (17.38%)</td>
<td></td>
<td></td>
<td>102 (30.63%)</td>
<td></td>
</tr>
<tr>
<td>Extending</td>
<td>33 (16.58%)</td>
<td>45 (13.72%)</td>
<td></td>
<td></td>
<td>79 (23.72%)</td>
<td></td>
</tr>
<tr>
<td>Socializing</td>
<td>5 (2.51%)</td>
<td>53 (16.16%)</td>
<td></td>
<td></td>
<td>19 (5.71%)</td>
<td></td>
</tr>
<tr>
<td>Reflecting</td>
<td>19 (9.55%)</td>
<td>18 (5.49%)</td>
<td></td>
<td></td>
<td>14 (4.20%)</td>
<td></td>
</tr>
<tr>
<td>Sharing emotions</td>
<td>7 (3.52%)</td>
<td>26 (7.93%)</td>
<td></td>
<td></td>
<td>23 (6.91%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>199 (100%)</td>
<td>328 (100%)</td>
<td></td>
<td></td>
<td>333 (100%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Discussion prompts vs initial posts

Table 4. Discussion prompts vs replies
In comparison, reflective prompts encouraged students to elaborate ideas \((n = 102; 30.63\%)\), extend ideas \((n = 79; 23.72\%)\) and share emotions \((n = 23; 6.91\%)\) in replies. Students mostly extended ideas by answering peers’ questions and asking further questions. This was important for the collective inquiry afforded by discussion boards as students moved beyond information sharing to advancing their understanding. These intertwining social interactions, emotions and reflection in replies appeared to support students to engage at a deeper level of knowledge construction as the discussions unfolded.

**Discussion**

Overall, this study contributes to the literature by inductively unpacking the content of discussion posts, identifying the emergent characteristics of these posts and establishing linkages between discussion prompts and posts. These findings demonstrate students’ collective inquiry in a CoI (Garrison et al., 1999, 2001). Students’ ideas elaborating and extending that were identified in this study mirror the indicators of cognitive presence in the exploration and integration phases of critical inquiry in a CoI (Garrison et al., 1999). However, this study shows additional important indicators of cognitive presence, namely, reflection and inquiring, which are conducive to deep learning and communal knowledge construction (Hakkarainen, 2003; van Aalst, 2009).

As van Aalst (2009) points out, students need to engage in reflective processes to move beyond knowledge sharing to possible knowledge construction and deep learning. Much research in learning sciences show this reflective process as an aspect of metacognition (Flavell, 1979) and a major component of effective learning processes leading to high-level cognitive activities and deep thinking (Lee et al., 2006; Liu, 2019; Yang et al., 2016).

The importance of inquiring in knowledge construction has also been widely studied in the fields of information science and learning sciences. Kuhlthau (2010) addresses inquiry as a way of learning that allows learners to engage in an extensive investigation of a question. Reynolds (2016) demonstrates that the student teams with higher game quality outcome scores engage in more inquiring practices. Hakkarainen (2003) argues that the iterative processes of inquiring and answering lead to deep learning and construction of coherent explanations.

This study further confirms the indicators of social presence that are found in Garrison et al. (1999), namely, sharing emotions, off-topic conversations and acknowledging others. Yet, this study extends CoI by showing the interweaving relationship of emotions and reflection as well as their contributions to knowledge construction. Flavell (1979) recognizes these cognitive and affective experiences in intellectual activities as “metacognitive experiences” that lead to better learning outcomes (p. 906). In information science, the interconnectedness of cognitive and affective experiences is described in the processes of searching for information to construct knowledge (Kuhlthau, 2004).

Similar to Garrison et al. (1999), the discussion prompts designed by the instructor in this current study demonstrate teaching presence in a CoI. This study further offers a valuable observational pattern between prompts and discussion posts. This connection between teaching presence, cognitive presence and social presence contributes to the conceptual understanding of CoI in online education.

Drawn upon these findings, this study has several practical implications and design recommendations for emergency remote teaching conditions particularly:

First, educators can design discussion prompts in an order of open-ended, explanatory and reflective as students delve deeper in learning activities. Educators can design open-ended questions by asking “What […]”, “How […]”, or “Discuss/describe […]”. Explanatory questions can start with “Why […]” or “Explain […]”. Examples of reflective
questions include “How has your understanding on a given topic changed after reading/watching ...?” or “Connect A, B and C concepts and identify/raise questions that you are still puzzled with.” Additionally, educators can consider asking these types of questions in replies to further encourage students’ inquiries and interactions.

Second, educators must recognize that emotions and social interactions are important aspects of effective communication in online learning and contribute to knowledge construction. Especially negative emotions such as uncertainties indicate a need for facilitation and intervention. Educators can provide more encouragement and clarifications in these situations (Kuhlthau et al., 2012; Kuhlthau, 2004, 2010). Socio-emotional interactions may also help students develop a sense of belonging to online learning communities (Rowntree, 1995). Educators may encourage students to share their emotions and socialize in online discussions.

Third, educators should maintain a strong teaching presence in online discussions to foster knowledge construction and ideas improvement. When students start exploring and sharing diverse ideas in response to open-ended questions, educators need to facilitate students to reflect upon their understanding, integrate emergent ideas and formulate a focused understanding (Kuhlthau, 2004, 2010). This describes a guided inquiry approach that educators can use in guiding deep learning (Kuhlthau, 2010).

This study is not free from limitations. One limitation is that this study did not measure knowledge construction but made the link through past evidence base on reflection, socio-emotional interactions and learning. Another limitation is that this study only used students’ discussion prompts, initial posts and replies to characterize students’ engagement. While it appeared that there was a lack of teaching presence in discussion boards, it was unclear if the instructor facilitated students’ discussions in other means such as announcements, emails and online lectures. Future research may triangulate multiple data sources to unpack the dynamics of asynchronous discussions in online courses.

Conclusion
Overall, this study described the dynamics of students’ discussion posts in response to various types of discussion prompts in a fully online library science course. The findings showed that students engage in simply stating, paraphrasing, elaborating, extending, reflecting, socializing and sharing emotions in discussion boards. These findings shed light on the interconnectedness of reflection and socio-emotional interactions in a community of inquiry and pointed out the important roles they played in supporting richer and deeper learning. The study also observed linkages between the types of discussion prompts and the types of discussion posts, which gave educators evidence-based design recommendations for prompts to elicit students’ reflection and socio-emotional interactions to support deeper knowledge construction. The practical implications of this study become particularly useful and timely in the current COVID-19 health crisis as educators need to change from traditional face-to-face to fully online teaching without much time to prepare themselves.

References


**Corresponding author**

Yawen Yu can be contacted at: yawen_yu.tranquil@hotmail.com

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